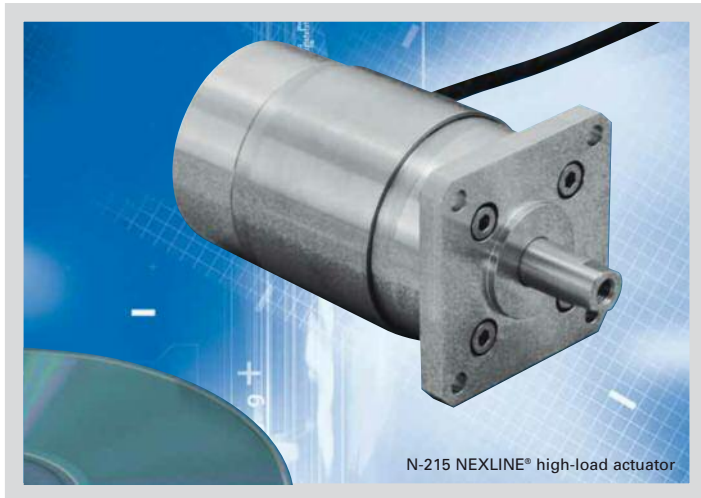


This product family has been replaced by the following new product:

>> N-216 NEXLINE® Linear Actuator

N-214, N-215 NEXLINE® Linear Motor/Actuator High-Force PiezoWalk® Drive for Long-Range Nanopositioning



N-215 NEXLINE® high-load actuator

- 20 mm Travel Range
- 0.03 nm Resolution Open-Loop and 5 nm Closed-Loop
- To 400 N Push / Pull Force and 600 N Holding Force
- Self Locking when Power down, No Heat Generation
- Non-Magnetic and Vacuum-Compatible Working Principle

The innovative N-214 / N-215 NEXLINE® OEM linear drives are ultra-precision nanopositioning actuators with travel ranges to 20 mm and push / pull forces to 400 N. The novel, patented NEXLINE® PiezoWalk® drive design combines long travel ranges with high mechanical stiffness and piezo-class resolution of better than 0.1 nm.

Application example

- Semiconductor technology
- Semiconductor testing
- Wafer inspection
- Nano lithography
- Nano imprint
- Nanometrology
- Active vibration damping
- Motion in strong magnetic fields

PiezoWalk® supports two different motion modes: a high-resolution, high-dynamics short range (analog) mode and a stepping mode with virtually unlimited travel range.

Two versions are available, the N-214 closed-loop model and N-215 open-loop model. Both can be operated with the sophisticated E-755 NEXLINE® motion controller. The N-214 is equipped with a 5 nm resolution linear encoder for long-range position control. Due to its low-noise, 24 bit D/A converters, the E-755 controller can provide picometer level resolution in the highly-dynamic short-range / dithering mode.

NEXLINE® Working Principle for Application Flexibility

NEXLINE® PiezoWalk® drives can be used wherever high loads must be positioned very precisely over long distances and then perhaps subjected to small-amplitude dynamic ad-

justment, as for active vibration control. By varying the combination of longitudinal and shear piezo elements, the step size, dynamic operating range (analog travel), clamping force, speed and stiffness can all be optimized for a particular application.

NEXLINE® PiezoWalk® Piezo-ceramic clamping and shear elements act directly on a moving runner that is coupled to the moved object. While the runner can be moved larger distances in step mode, analog operation over a distance of less than one step enables high-dynamics positioning with resolutions far below one nanometer. The patented PiezoWalk® overcomes the limitations of conventional nanopositioning actuators and combines long travel ranges with high resolution and stiffness.

High-Resolution Dynamic Operation

In analog mode the motion is effectuated exclusively by the very stiff shear elements, providing a resonant frequency in the direction of motion of several kilohertz. The motion resolution here is limited only by the stability of the drive electronics, or, in closed-loop operation, by the sensor.

Basically Unlimited Travel Range

Step mode involves a sequence of coordinated shear and

Ordering Information

N-214.00
NEXLINE® High-Load Actuator, 20 mm, 200 N, linear encoder, 5 nm resolution

N-215.00
NEXLINE® High-Load Actuator, 20 mm, 400 N, open-loop

clamping moves. That is why piezo stepping drives have no intrinsic travel limitation and can be used flexibly. The max. step frequency of 100 Hz and is determined by the controller. It allows velocities up to 1 mm/s, depending on the step size and / or analog range.

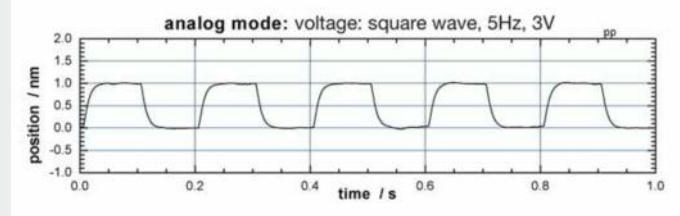
Unlimited Lifetime

The application area of NEXLINE® drives often lies in the difficult-to-access internals of machines, where nanometer-real adjustment and vibration cancellation are required.

Long lifetime is therefore a basic requirement for NEXLINE® actuators. To promote long lifetime, the controller can reduce the operating voltage on all the piezo elements to zero at any position and still maintain the full holding force.

Note

The products described in this document are in part protected by the following patents:
German Patent No. 10148267
US Patent No. 6,800,984



Train of 1 nm steps in open-loop analog mode with an N-215 NEXLINE® actuator

**This product family has been replaced
by the following new product:**

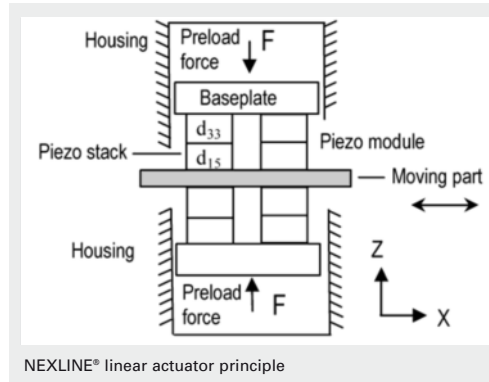
>> N-216 NEXLINE® Linear Actuator

Piezo • Nano • Positioning

PI



Six-axis parallel-kinematics Hexapod with N-215-based NEXLINE® high-load actuators for use in strong magnetic fields.



NEXLINE® linear actuator principle

Linear Actuators & Motors

PiezoWalk® Motors / Actuators

PILine® Ultrasonic Motors

DC-Servo & Stepper Actuators

Piezo Actuators & Components

Guided / Preloaded Actuators

Unpackaged Stack Actuators

Patches/Benders/Tubes/Shear..

Nanopositioning / Piezoelectrics

Nanometrology

Micropositioning

Index

Model	N-214.00	N-215.00
Active Axes	X	X
Motion and positioning		
Travel range	20 mm	20 mm
Step size in stepping mode	10 nm to 6 µm	10 nm to 6 µm
Integrated sensor	Linear encoder	–
Sensor resolution	5 nm	–
Travel range in analog mode	3 µm	3 µm
Open-loop resolution	0.03 nm	0.03 nm
Closed-loop resolution	5 nm	–
Step frequency	100 Hz*	100 Hz*
Open-loop velocity**	0.3 mm/s	0.3 mm/s
Closed-loop velocity**	0.15 mm/s	–
Mechanical properties		
Stiffness in motion direction	75 N/µm	150 N/µm
Drive force (active)	200 N	400 N
Holding force (passive)	300 N	600 N
Drive properties		
Drive type	NEXLINE® linear drive	NEXLINE® linear drive
Operating voltage	±250 V	±250 V
Miscellaneous		
Operating temperature range	-40 to 80 °C	-40 to 80 °C
Material	Al (anodized), steel	Al (anodized), steel
Mass	1050 g	1150 g
Cable length	4.0 m	2.0 m
Connector	D-sub single-channel NEXLINE® connector, plus separate sensor connector	D-sub single-channel NEXLINE® connector
Recommended controller / driver	E-755.1A1 (see p. 1-18)	E-755.101 (see p. 1-18)

*Depends on control electronics

**Depends on control electronics. The maximum speed in step mode is set so as to ensure the highest possible velocity constancy, with no speed fluctuations while steps are being performed.